

Descriptions

This is 650V Super-Junction Power N-MOSFET in a TO-247-3L Plastic Package.

Features

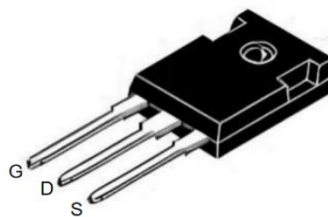
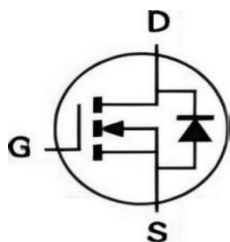
- Optimized for synchronous rectification
- Low Input Capacitance
- Low Miller Capacitance
- Fully Characterized Capacitance and Avalanche
- Pb-free lead plating; RoHS compliant

Key Performance Parameters		
Parameter	Value	Unit
V_{DS}	650	V
$R_{DS(ON)max}, V_{GS}=10V$	69	mΩ
I_D	48	A
Q_G	88.5	nC

Applications

- BLDC Motor drive applications
- Battery powered circuits
- Synchronous rectifier applications
- Resonant mode power supplies

Equivalent Circuit & Pinning



TO-247-3L

Absolute Maximum Ratings(Ta=25°C)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current-Continuous Note1	T _c = 25°C	I_D	48	A
	T _c = 125°C		32	A
Drain Current-Pulsed Note2	T _c = 25°C	I_{DM}	144	A
Avalanche Current		I_{AS}	12	A
Single Pulse Avalanche Energy Note3		E_{AS}	1440	mJ
Maximum Power Dissipation	T _c = 25°C	P_{tot}	347	W
Storage Temperature Range		T_{STG}	-55 to 150	°C
Operating Junction Temperature Range		T_J	-55 to 150	°C

Thermal Resistance Ratings

Parameter	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient Note4	Steady State			62	°C/W
Thermal resistance, Junction-to-Case ^{Note4}	Steady State			0.36	°C/W

Notes:

1. The maximum current rating is package limited.
2. Pulse Test: Pulse Width ≤ 10μs.
3. Starting T_J=25°C, V_D=50V, L=20mH, V_{GS}=10V.
4. For surface-mounted devices, both R_{thJC} and R_{thJA} are measured with the device mounted on approximately 1"×1"FR-4 PCBs. In actual applications, many factors including the PCB material and layout, may affect the thermal resistance of the device-board assembly. For best results, characterize the thermal resistance directly in the application circuit.

Electrical Characteristics (TJ=25°C)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	VGS=0V, IDS=250μA	650			V
Zero Gate Voltage Drain Current	I_{DSS}	VDS=650V, VGS=0V, TJ=25°C			1	μA
		VDS=650V, VGS=0V, TJ=125°C			100	μA
Gate-Source Leakage Current	I_{GSS}	VGS=±30V, VDS=0V			±100	nA

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	VDS=VGS, IDS=250μA	2.5		3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	VGS=10V, IDS=20A		64	69	mΩ
Gate Resistance	R_g	VGS=0V, VDS=0V, f=1MHz		1.07		Ω

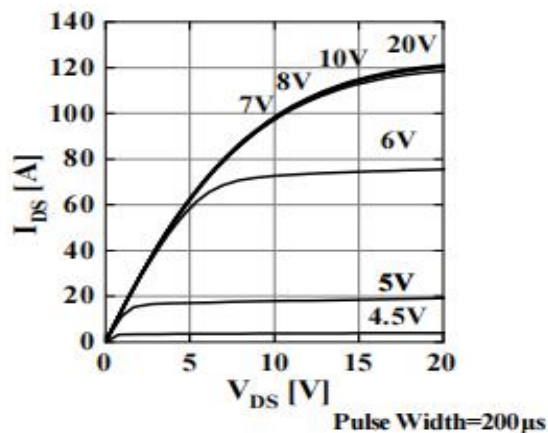
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	VDS=100V, VGS=0V, f=100kHz		3960		pF
Output Capacitance	C_{oss}	VDS=100V, VGS=0V, f=100kHz		150		pF
Reverse Transfer Capacitance	C_{rss}	VDS=100V, VGS=0V, f=100kHz		2.1		pF
Turn-On Delay Time	$T_d(on)$	VDS=480V, VGS=18V, IDS=24A, RG=3Ω		28.16		ns
Rise Time	t_r	VDS=480V, VGS=18V, IDS=24A, RG=3Ω		71		ns
Turn-Off Delay Time	$T_d(off)$	VDS=480V, VGS=18V, IDS=24A, RG=3Ω		83.84		ns
Fall Time	t_f	VDS=480V, VGS=18V, IDS=24A, RG=3Ω		14.72		ns

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q_{gs}	VGS= 0 to 10V, VDD=400V, ID=24A		14.7		nC
Gate to Drain Charge	Q_{gd}	VGS= 0 to 10V, VDD=400V, ID=24A		26.6		nC
Gate Charge Total	Q_G	VGS= 0 to 10V, VDD=400V, ID=24A		88.5		nC

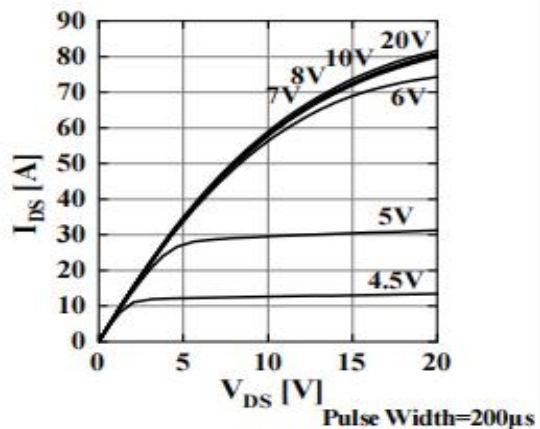
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{SD}	VGS=0V, IF=24A		0.84	1.08	V
Body Diode Reverse Recovery Time	t_{rr}	VDD=480V, IF=24A, di/dt=100A/μs		381.4		ns
Body Diode Reverse Recovery Charge	Q_{rr}	VDD=480V, IF=24A, di/dt=100A/μs		8.16		μC
Reverse Recovery Current	I_{RRM}	VDD=480V, IF=24A, di/dt=100A/μs		42.79		A

Electrical Characteristic Curve

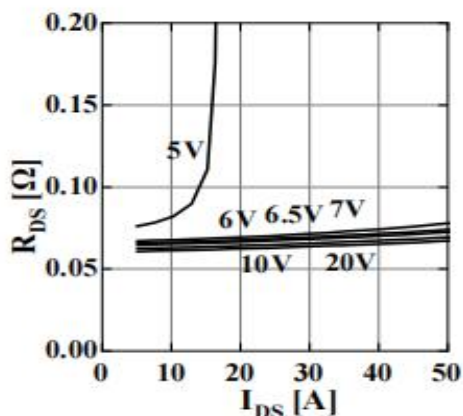
TYP.Output Characteristics T=25°C



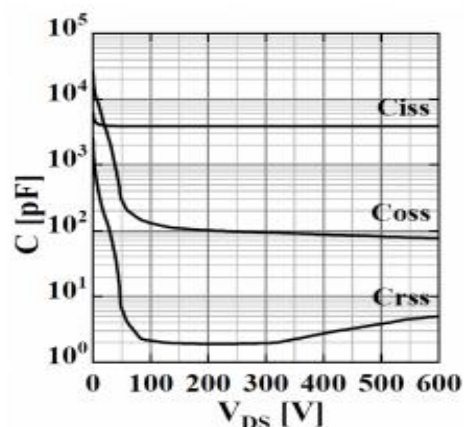
TYP.Output Characteristics T=125°C



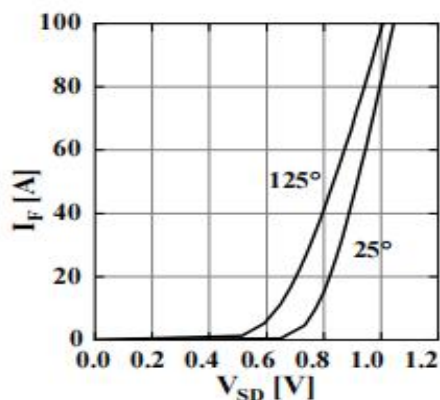
TYP.Drain-Source On-Resistance vs Drain Current



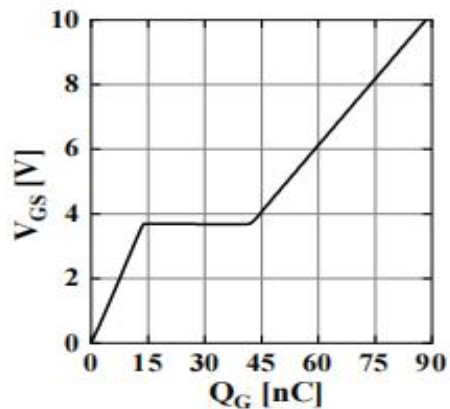
TYP.Capacitances



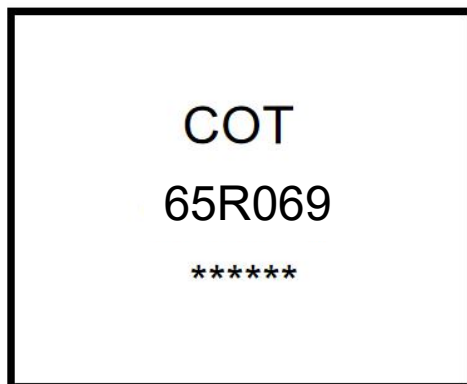
TYP.Body Diode Characteristics



TYP.Gate Charge



Marking Instructions



Note:

COT: Company Code

65R069: Product Type.

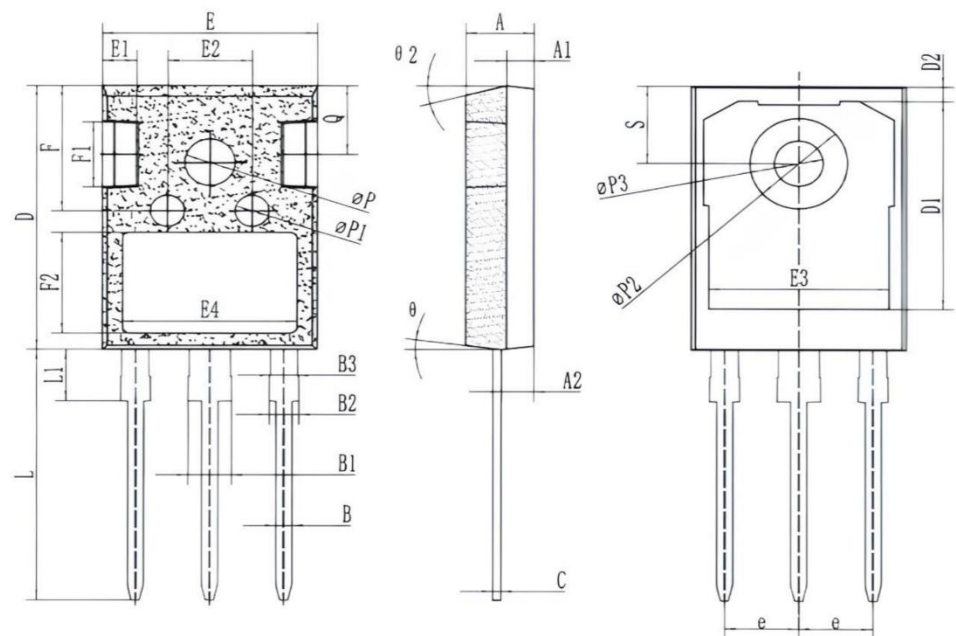
*****: *: Inner Code * : Year Code **: Week Code **: Lot Code

Ordering Information

Ordering Code	RoHS Status	Package	Quantity
CT65R069EHA	Halogen-Free	TO-247-3L	Tube

Package Outline Dimensions

TO-247 -3L



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.9	5	5.1
A1	1.9	2	2.1
A2	2.3	2.4	2.5
B	1.14	1.19	1.24
B1	3.05	3.15	3.25
B2	2	2.1	2.2
B3	1.9	2	2.1
C	0.55	0.6	0.65
D	20.8	21	21.2
D1	16.35	16.55	16.75
D2	1.02	1.17	1.32
E	15.6	15.8	16
E2	2.4	2.5	2.6
E3	6.1	6.2	6.3
E3	13.06	13.26	13.46
E4	12.7	12.8	12.9
F	9.8	10	10.2
F1	4.8	5.1	5.4
F2	7.9	8	8.1
e	5.436 BSC		
L	19.72	19.92	20.12
L1	3.9	4.1	4.3
ΦP	3.55	3.75	3.95
$\Phi P1$	2.4	2.5	2.6
$\Phi P2$	7.09	7.19	7.29
$\Phi P3$	3.5	3.6	3.7
S	6.05	6.15	6.25
Q	5.4	5.5	5.6
θ	5°	7°	9°
1	5°	7°	9°
2	13°	15°	17°